



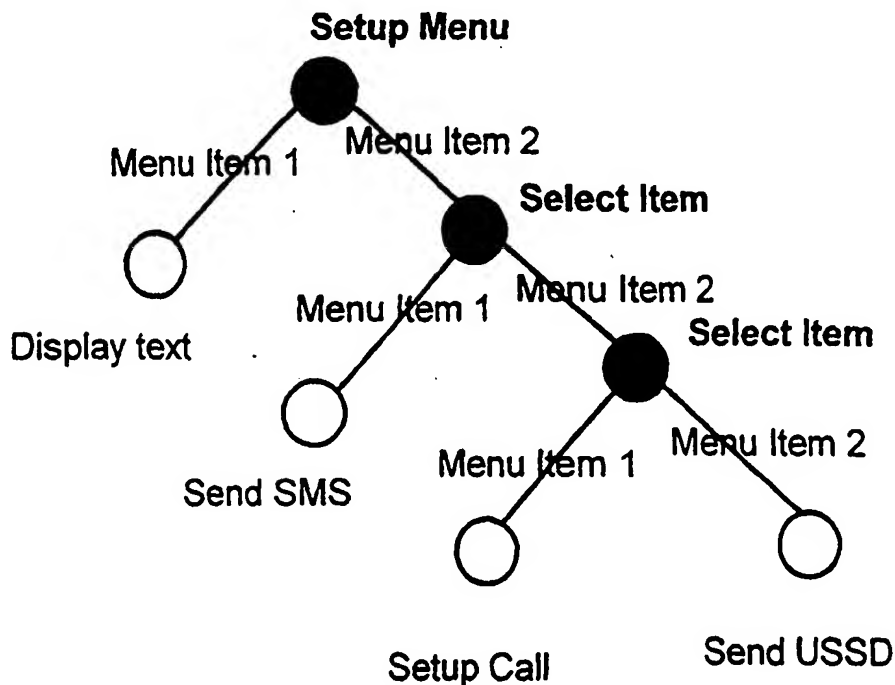
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> : <b>H04Q</b>		A2	(11) International Publication Number: <b>WO 99/63767</b>
			(43) International Publication Date: 9 December 1999 (09.12.99)
(21) International Application Number: PCT/SE99/00958 (22) International Filing Date: 2 June 1999 (02.06.99)  (30) Priority Data: 9802004-3      5 June 1998 (05.06.98)      SE  (71) Applicant (for all designated States except US): TELIA AB (publ) [SE/SE]; Mårbackagatan 11, S-123 86 Farsta (SE).  (72) Inventors; and (75) Inventors/Applicants (for US only): EMILSSON, Stellan [SE/SE]; Grän 31, S-655 94 Karlstad (SE). BLOMKVIST, Håkan [SE/SE]; Horsensgatan 39 H, S-654 59 Karlstad (SE). KÅWE, Rolf [SE/SE]; Lingonstigen 7, S-654 68 Karlstad (SE). ANDERSSON, Per [SE/SE]; Älvdalsgatan 8 A, S-652 29 Karlstad (SE).  (74) Agent: PRAGSTEN, Rolf; Telia Research AB, Vitsandsgatan 9, S-123 86 Farsta (SE).		(81) Designated States: EE, JP, LT, LV, NO, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  Published <i>Without international search report and to be republished          upon receipt of that report.</i>	

(54) Title: DEVICE AND METHOD FOR UPDATING OF SERVICE LOGIC IN A MOBILE UNIT

## (57) Abstract

The present invention relates to a device and a method at a cellular digital radio communications system including means for mobile or semi-stationary communication which utilises SIMAT-based information messages and which makes possible for a user to load a service data structure to his/her mobile unit in form of a general application to the in the mobile unit arranged SIM-card, and where said application by means of the in the mobile terminal arranged device includes means to interpret the content in said service data structure and means to process and convert said service data structure to a specific telecommunications and/or data service. The invention allows an improved and capacity efficient utilisation of the transmission qualities of the digital radio communications system.



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DEVICE AND METHOD FOR UPDATING OF SERVICE LOGIC IN  
A MOBILE UNIT

TECHNICAL FIELD

5 The present invention relates to a new device and method at  
a cellular digital radio communications system including  
means for mobile or semi-stationary communication which  
utilises SIMAT-based messages and which makes possible for  
a user of with the system co-operating units to load to  
10 said mobile unit a service data structure in form of a  
general application to the in the mobile unit arranged SIM-  
card and where said service data structure can be  
converted, via by means of utilisation of a, on said SIM-  
card arranged and with the service data structure co-  
15 operating, service interpreter, to a specific  
telecommunications and/or data service, so that a capacity  
efficient utilisation of the transmission qualities of the  
system is achieved.

20 PRIOR ART

In cellular radio systems it is previously known to utilise  
technologies including means where one to the mobile unit  
loads, via the signalling channels of the system, a  
complete implementation of a telecommunications and/or data  
25 service. The technologies, however, are typically very  
resource demanding with regard to, i.a. the time  
consumption for loading of information, respective the  
transmission capacity in the radio system. With below  
stated problems as a consequence.

30

What is not previously known and which consequently  
constitutes a new device and method is to, in a cellular  
radio communications system for mobile or semi-stationary  
communication which includes SIMAT-based message managing,  
35 have possibility to divide the information content into two  
separate logic parts and where a first part is arranged in

the with the system co-operating SIM-card of the mobile terminal, including means to convert the message content of the second part to a telecommunications and/or data service which can be executed by the mobile unit, and where the  
5 method and the device primarily is aimed at improving the capacity utilisation in said system.

## DESCRIPTION OF THE INVENTION

### 10 TECHNICAL PROBLEM

The telecommunications services of the future will require an ever increasing bandwidth. At the same time the need for terminal mobility will increase further in comparison with the mobility possibilities of today. Terminal mobility  
15 normally takes for granted that radio communication is utilised for transmission of information between two or more in the system included units. The available frequency range, however, is a limited resource, so the allocation of this resource will necessarily be limited for the new  
20 technologies which primarily are intended for relative capacity demanding applications or services. The limitation of the frequency spectrum consequently results in that the use of it has to be extremely efficient if it shall be possible to execute the new services within the frame of  
25 requested quality.

Mobile networks belong to the most signal intensive of all public networks. The signalling load will increase in the telecommunications networks by the introduction of new  
30 functions which are used for call managing. In the mobile networks, signalling loads which are caused by registration of the mobile unit, change of base station, authority checks etc will be added. In addition the signalling will be utilised for user data which are transmitted as short  
35 messages. Such short message traffic will strongly influence the signalling load in future networks as the

short message services are expected to be very much utilised.

SIMAT (SIM Application Toolkit) is a new amendment to the  
5 GSM-standard which describes the communication interface  
between SIM-cards and the mobile unit. As a consequence of  
this new amendment to the GSM-standard, the mobile  
telephone manufacturers have no longer monopoly of  
implementing new services in the mobile unit, but it has  
10 via the new standard also opened up quite new possibilities  
for telecommunications operators to implement own  
functionality on the in the mobile units arranged SIM-card.

A SIM-card (Subscriber Identity Module), however, holds a  
15 limited amount of storing capacity regarding the memory and  
which in reality only allows that a comparatively small  
number of applications can be stored on the card at the  
same time. One way of evading the problem of the limited  
storage capacity is to, via the radio system, load to the  
20 mobile unit a certain application which the user needs on a  
certain occasion. The problem is that such a procedure will  
take comparatively long time, of the order of minutes, to  
load new applications to the user's mobile unit, a fact  
which may make new services less attractive to the users.  
25 The invention aims at solving this problem.

When SIMATs which can be loaded and which are based on  
telecommunications and data services will be utilised to a  
great extent, this will result in that the transmitting  
30 channels of the radio communications system will be heavily  
loaded, which will cause a considerable problem for the  
general capacity utilisation of the system. The invention  
aims at solving also this problem.

## THE SOLUTION

The main characteristics of the invention are further stated in the following patent claims.

### 5 ADVANTAGES

The previously known technologies for loading telecommunications and data applications utilise, in comparison with the present invention, large amounts of transmitting capacity at the transmission of information  
10 between the base station and the mobile unit, and great time consumption during which the call capacity of the radio system decreases. These previously known technologies, however, will not be sufficiently efficient for bandwidth demanding applications, especially not when  
15 the number of attractive services increases.

The chances for new broadband applications in cellular radio systems for that reason will increase considerably if one by utilisation of the present invention can optimise  
20 the transmission of signals at the loading of new services to the user's mobile unit.

Another advantage of the present invention is that the network operator is given a complete control of the  
25 implementation of SIMAT-based services, that he/she can build in wanted safety and fault management in the general application, and that the system by that can be utilised in a more capacity efficient way.

30 One further advantage is that the invention can be implemented essentially in all cellular radio systems which utilise SIMAT-based messages between the network and the with the network co-operating mobile units.

## DESCRIPTION OF DRAWINGS

One at present suggested embodiment of a method which shows the for the invention significant characteristics is described below with reference to enclosed drawings where,

5

Figure 1 shows the service logic in form of a tree structure.

Figure 2 shows in the system included components and how these co-operate.

10

## DETAILED EMBODIMENT

The present invention is above all applicable to such cellular radio communications systems for mobile communication which utilise SIMAT-based information messages including applications for telecommunications and data services.

15

An implementation of a SIMAT-based service consists of an application on the SIM-card of the mobile unit and which includes all data structures and program logic which is required to build up a menu structure by means of which a user can select and initiate different events he/she wants to perform by means of the mobile unit.

20

25

One application is based on that SIMAT-commands are transmitted in both directions between the SIM-card and the mobile unit. When a user makes a menu selection, a SIMAT-message is transmitted to the SIM-card where the application interprets the content of the message and after that transmits a new SIMAT-message to the mobile unit. By means of the SIMAT-message, menu structures can be defined, calls be established, SMS-messages be transmitted etc. See Figure 2.

30

35

As example of a SIMAT-based service here a tree structure is described, see Figure 1, where the nodes of the tree symbolise SIMAT-commands and the "branches" between the nodes indicate different menu selections. The structure means that a user via a menu structure, which can be built up in several levels, finally will have selected what he/she wants to have executed. The SIMAT-command is divided into two categories, on one hand those which define the menu structure, see filled up circles in Figure 1, and on the other those which are executing something, see non-filled up circles in Figure 1. This description of a service here is called service logic, which can be translated into a well defined data format, here called the service data structure, which for instance can be transmitted as an SMS-message (Short Message Service) between the in the system included base stations and the mobile unit in question.

Thanks to that SIMAT-applications are strongly attached to transmit and receive well defined messages, and that a menu selection in its turn generates a new message, it is made possible to describe a specific service by means of utilising a service data structure which can be interpreted as a general application, here called service interpreter. By the division a service is loaded to a mobile terminal only in form of a service data structure which results in that the transmitted amount of information can be heavily reduced, which in its turn contributes to a reduced load on the signal transmission channels of the radio communications system, and that the services can be loaded considerably faster than by utilisation of the technologies of today.

By the solution with a service data structure, the message content of which is interpreted by a service interpreter, a service is defined not in terms of source code or object



code, but only by means of a service data structure. For the purpose of the service interpreter interpreting the service data structure, this is transmitted in form of a well defined message via SMS- or Cell Broadcast technology to the on the SIM-card arranged service interpreter. See Figure 2.

The present embodiment is described on the basis of a perspective where telecommunications and data services are implemented on a GSM SIM-card which communicates with a mobile unit by means of utilising SIMAT-commands and where data storing for distribution of the service data structure is made via the previously known transmission technologies SMS or Cell Broadcast. The suggested solution, however, can also be applied to other systems, such as UMTS (Universal Mobile Telephone System).

The invention consequently is not limited to the as example described embodiment, but may in addition be subject to modifications within the frame of the following patent claims and the idea of invention.

## PATENT CLAIMS

1. Device at a cellular digital radio communications system including means for mobile or semi-stationary communication which utilises SIMAT-based information messages between the in the system included transmitting and receiving equipments in said system, characterised in that to a cellular radio system belonging mobile unit is allocated device which includes means to interpret a service data structure containing a description of a telecommunications and/or data service, that said device is allocated means to manage all logic and data structures which are necessary to transmit and receive general SIMAT-commands, that said device is allocated means which guarantees that the functionality of new data structures which are received are within in advance set demands of information security, that said device includes means which detects and manages faults in the received data structure.

2. Device according to patent claim 1, characterised in that the radio communications system is arranged to transmit information over a common carrier wave including user unique codes, and that the carrier wave is arranged for transmission of said information to, respective from, one in said system transmitting and receiving equipment.

3. Device according to patent claim 1, characterised in that the digital radio communications system is arranged to transmit information in time slots divided into time frames, and that selected time frames are arranged for transmission of information to, respective from, a transmitting and receiving equipment in said system.

4. Device according to patent claim 1,  
c h a r a c t e r i s e d in that the device includes means  
to makes it possible to decompress received compressed data  
structure.

5

5. Device according to any of the preceding patent  
claims, c h a r a c t e r i s e d in that said radio  
communications system is arranged with one or more units  
for reception and transmission of information, which can be  
10 called from, respective to, one in said system included  
mobile or stationary unit.

15

6. Device according to any of the preceding patent  
claims, c h a r a c t e r i s e d in that the service data  
structure is transmitted from one or more in the system  
included base stations to the mobile unit via SMS or Cell  
Broadcast.

20

7. Device according to any of the preceding patent  
claims, c h a r a c t e r i s e d in that the SIMAT-command  
is divided into one menu structure part and one executing  
part.

25

8. Device according to any of the preceding patent  
claims, c h a r a c t e r i s e d in that one or more  
services in the radio communications system are loaded to  
one or more mobile units in form of a service data  
structure.

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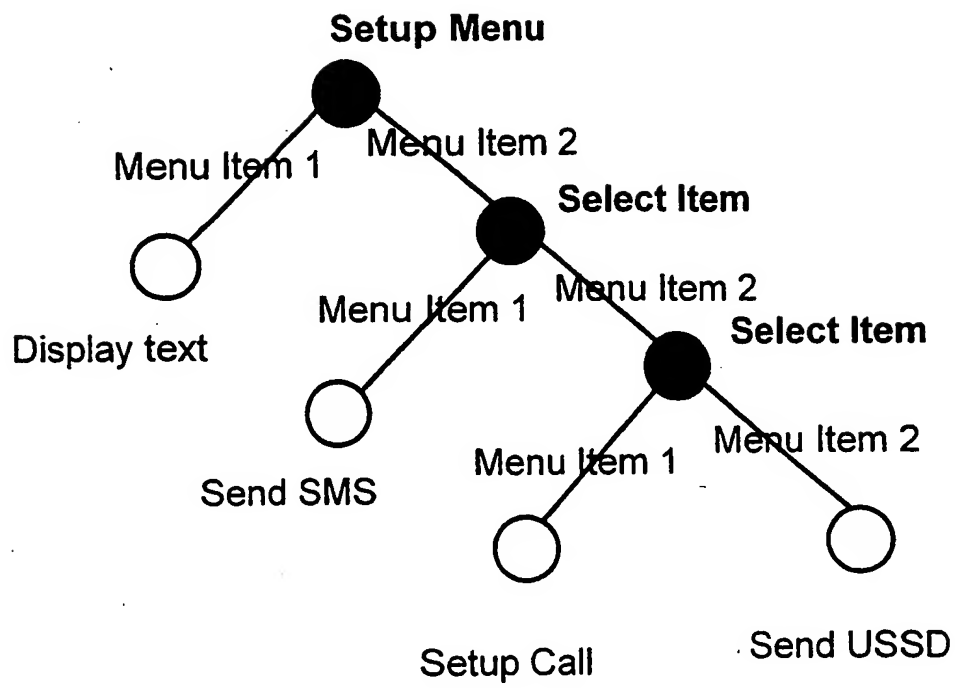
9. Device according to any of the preceding patent  
claims, c h a r a c t e r i s e d in that the SIMAT-command  
is arranged to be transmitted in both directions between  
the SIM-card and the mobile unit.

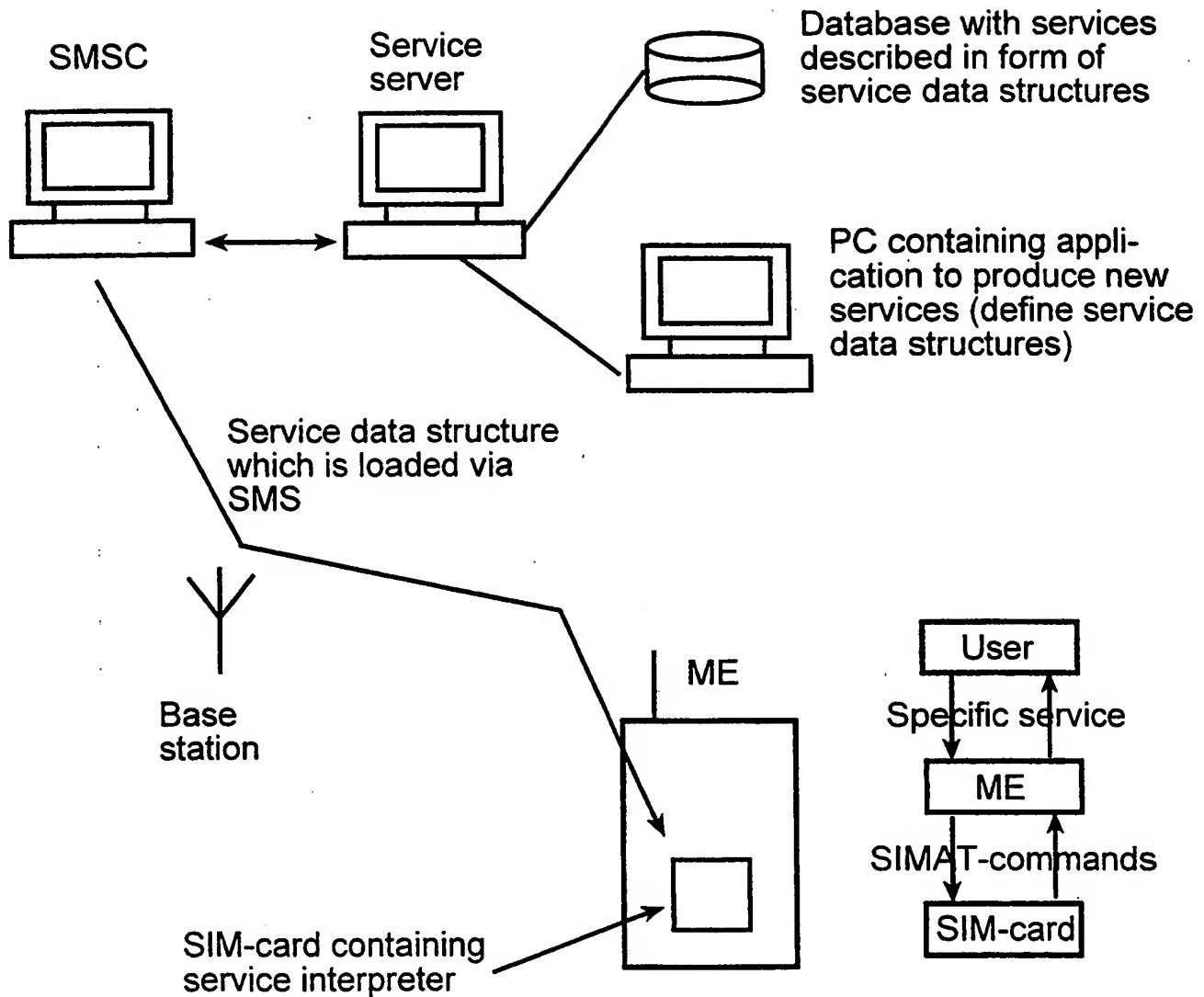
35

10. Method at a cellular digital radio communications  
system including means for mobile or semi-stationary

communication which utilises SIMAT-based information  
messages between the in the system included transmitting  
and receiving equipments in said system,  
c h a r a c t e r i s e d in that to a cellular radio  
5 system belonging mobile unit are allocated devices which  
include means for interpreting a service data structure  
containing a description of a telecommunications and/or  
data service, that said device is allocated means for  
managing all logic and data structures which are necessary  
10 to transmit and receive general SIMAT-commands, that said  
device is allocated means which guarantees that the  
functionality of new data structures which are received are  
within in advance set demands of information security, and  
that said device includes means which detects and manages  
15 faults in the received data structure.

1/2

**Figure 1**



ME: Mobile Equipment (Mobile telephone except SIM-card)  
 SIM-card: Subscriber Identity Module  
 SMSC: SMS Center  
 Service server: A server connected to the GSM-network which contains logic and data structures by means of which a description of a service can be loaded to the SIM-card of the mobile telephone.

Figure 2



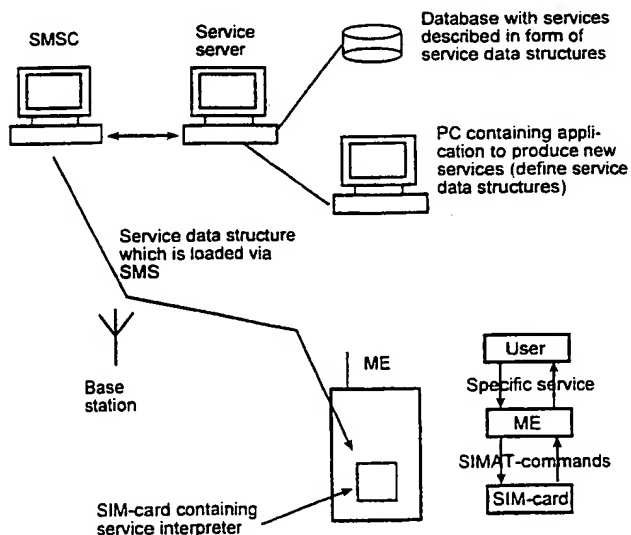
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			(43) International Publication Date: 9 December 1999 (09.12.99)
(21) International Application Number: PCT/SE99/00958 (22) International Filing Date: 2 June 1999 (02.06.99) (30) Priority Data: 9802004-3 5 June 1998 (05.06.98) SE (71) Applicant (for all designated States except US): TELIA AB (publ) [SE/SE]; Mårbackagatan 11, S-123 86 Farsta (SE). (72) Inventors; and (75) Inventors/Applicants (for US only): EMILSSON, Stellan [SE/SE]; Grän 31, S-655 94 Karlstad (SE). BLOMKVIST, Håkan [SE/SE]; Horsensgatan 39 H, S-654 59 Karlstad (SE). KÅWE, Rolf [SE/SE]; Lingonstigen 7, S-654 68 Karlstad (SE). ANDERSSON, Per [SE/SE]; Älvdalsgatan 8 A, S-652 29 Karlstad (SE). (74) Agent: PRAGSTEN, Rolf; Telia Research AB, Vitsandsgatan 9, S-123 86 Farsta (SE).		(81) Designated States: EE, JP, LT, LV, NO, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published With international search report. (88) Date of publication of the international search report: 27 January 2000 (27.01.00)	

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## (57) Abstract

The present invention relates to a device and a method at a cellular digital radio communications system including means for mobile or semi-stationary communication which utilises SIMAT-based information messages and which makes possible for a user to load a service data structure to his/her mobile unit in form of a general application to the in the mobile unit arranged SIM-card, and where said application by means of the in the mobile terminal arranged device includes means to interpret the content in said service data structure and means to process and convert said service data structure to a specific telecommunications and/or data service. The invention allows an improved and capacity efficient utilisation of the transmission qualities of the digital radio communications system.



ME: Mobile Equipment (Mobile telephone except SIM-card)  
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 SMSC: SMS Center  
 Service server: A server connected to the GSM-network which contains logic and data structures by means of which a description of a service can be loaded to the SIM-card of the mobile telephone.

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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 99/00958

## A. CLASSIFICATION OF SUBJECT MATTER

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0562890 A1 (HUTCHISON MICROTTEL LIMITED), 29 Sept 1993 (29.09.93), abstract --	1,10
A	WO 9714258 A1 (QUALCOMM INCORPORATED), 17 April 1997 (17.04.97), abstract --	1,10
P,A	EP 0869691 A2 (DEUTSCHE TELEKOM AG), 7 October 1998 (07.10.98), claim 1, abstract --	1,10
P,A	WO 9838820 A2 (TELEFONAKTIEBOLAGET LM ERICSSON), 3 Sept 1998 (03.09.98), claim 1, abstract -----	1,10

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☒ See patent family annex.

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Date of the actual completion of the international search

18 November 1999

Date of mailing of the international search report

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02/11/99

International application No.

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				CA 2234558 A	17/04/97
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EP	0869691	A2	07/10/98	DE 19713965 A	08/10/98
WO	9838820	A2	03/09/98	AU 6640398 A	18/09/98